

ON THE USE OF SAMPLING THEOREM IN THE METHOD OF
MOMENT FOR SURFACE SCATTERING SIMULATION

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The method of moment(MoM) is a numerical procedure for solving the equation

$$Lf = g \quad (1)$$

where L is a continuous linear operator, f is the unknown function to be determined and g is a known excitation. In essence, the procedure converts the linear equation into a matrix equation and determines the unknown function in the form of a set of samples of the function through matrix inversion. It is well known that the sampling theorem states that to completely represent a function, one requires a minimum of two samples per wavelength, when basis function is the Sinc function. Thus, by choosing the Sinc function as the testing and basis function in MoM implementation, we should have the smallest possible size for the matrix. In this paper, the Sinc-Galerkine MoM has been developed and the number of the unknowns has been discussed. The formulations for the unknown current of 2-D rough surface for both VV and HH polarization have been developed based on the Sinc-Galerkine procedure. Then backscattering coefficients of VV and HH polarization have been further computed by calculated unknown current respectively. To test the above stated approach, we calculate the scattering coefficient from 2-D rough surface with a Gaussian distribution. The standard point matching approach is also used so that comparisons can be made between the two results. By comparing these numerical calculations with the IEM model, it is found that to achieve the same degree of accuracy, the number of unknowns used in the point matching method is an order of magnitude more than when the Sinc function is used as the basis function. This reduction in matrix size is specially significant in a three dimensional surface scattering problem, because we shall be able to reduce the matrix size by two orders of magnitude.

Abstract Submission Form

2006 National Radio Science Meeting

Abstract: huang24553

Date Received: September 16, 2005

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4. C - Contributed Paper, Program chair: Roger Lang
5. No special instructions